

REMARKS

Claims 1-12, 18, 20 and 24 stand withdrawn from consideration. By this amendment, Claim 14 has been canceled and the subject matter of Claim 14 has been incorporated into independent Claim 13. Claim 13 has been further amended to require that the directions of the respective electric currents in the adjacent antennas are the same. New Claim 25 requires that induction electric fields due to respective electric currents in the plurality of antennas are strengthened by each other. New Claim 25 is deemed to read on Species A (Fig. 1A). Support for these changes can be found at page 9, line 31-page 10, line 4 of the specification. Finally, Claims 15-17 and 21-23 have been amended to depend from Claim 13. In view of the foregoing amendments and the following remarks, reconsideration of the September 12, 2005 Office Action is respectfully requested.

The invention relates to an improved plasma processing apparatus that is adapted to generate high-density plasma with high efficiency over large areas (see page 18, lines 4-8 of the specification). The inventive apparatus represents an improvement over conventional capacitively-coupled and inductively-coupled apparatuses (page 2, line 4-page 4, line 6).

Independent Claim 13, as amended, recites a plasma processing apparatus having a plurality of linear and/or curved metal-based radio frequency antennas in a process chamber of the apparatus. Pointedly, Claim 13 requires that the antennas be arranged so that the directions of the respective electric currents in

adjacent antennas are the same. This configuration results in a strengthening of the induction electric fields in the respective plural antennas (see page 9, line 31- page 10, line 4 and Figure 1). None of the cited references disclose or suggest a plasma processing apparatus having a plurality of radio-frequency antenna disposed in a process chamber such that directions of the respective electric currents in adjacent antennas are the same.

First Rejection

Claims 13-14, 16 and 23 were rejected under 35 U.S.C. § 103(a) as allegedly obvious over U.S. Patent No. 6,469,448 to Taguchi in view of U.S. Patent No. 6,280,563 to Baldwin¹. This rejection is respectfully traversed.

To establish a *prima facie* case of obviousness, **all** the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).

Taguchi discloses an inductively coupled plasma source comprising a plurality of one-turn antenna coils (see abstract). The one-turn antenna coils 9 are arranged at intervals in the longitudinal axial direction along the outer circumference of the plasma-generating chamber 8 (see abstract and column 4, lines 1-13). However, Taguchi fails to disclose or suggest a plurality of radio-frequency antennas such that the respective electric currents in adjacent antennas are the same, as required by Claim 13.

¹ In view of the cancellation of Claim 14, the rejection of Claim 14 is moot.

Baldwin, which was cited for disclosing a metal top plate, fails to remedy the deficiencies of Taguchi with respect to independent Claim 13. Accordingly, withdrawal of the rejection is respectfully requested.

Second Rejection

Claims 15 and 19 were rejected under 35 U.S.C. § 103(a) as allegedly obvious over Taguchi and Baldwin in view of U.S. Patent Application Publication No. 2003/0168172 to Glukhoy. This rejection is respectfully traversed.

Glukhoy, which was cited for disclosing the feature of an antenna covered with an insulating material, discloses a plasma treatment apparatus 20 comprising plasma-excitation or antenna tubes 80 (see paragraphs 35 and 36). Conductors 77 connect the adjacent ends of adjacent tubes on each side of the housing electrically such that all the plasma excitation tubes are connected in series in the form of a conductive spiral body (see paragraph 36). Thus, in the apparatus of Glukhoy, the electric current in one antenna tube (e.g., 80b) flows in a direction opposite to the electric current in each adjacent antenna tube (80a and 80c). Accordingly, Glukhoy does not remedy the deficiencies of Taguchi and Baldwin with respect to Claim 13. Withdrawal of the rejection is requested.

Third Rejection

Claim 17 was rejected under 35 U.S.C. § 103(a) as allegedly obvious over Taguchi and Baldwin in further view of U.S. Patent No. 5,975,013 to Holland or U.S. Patent Application Publication No. 2004/0020432 to Takagi. This rejection is respectfully traversed.

Holland, which was cited in the Office Action for disclosing a radio-frequency antenna having a variable thickness or diameter, merely discloses a vacuum plasma processor having a planar coil located outside the plasma processor (see abstract) and does not remedy the deficiencies of Taguchi and Baldwin with respect to Claim 13.

Takagi, which also was cited in the Office Action for disclosing a radio-frequency antenna having a variable thickness or diameter, discloses a plasma apparatus having one or more inductively coupled electrodes 2 (see paragraphs 42, 52, 61 and 65). While Takagi discloses that a (single) straight line electrode can be used instead of the folded electrode shown in Figure 1, Takagi does not disclose or suggest a plurality of linear and/or curved antennas wherein the directions of the respective electric currents in adjacent antennas are the same. Thus, the deficiencies of Taguchi and Baldwin with respect to Claim 13 are not remedied by Takagi. Withdrawal of the rejection is requested.

Fourth Rejection

Claims 21 and 22 were rejected under 35 U.S.C. § 103(a) as allegedly obvious over Taguchi and Baldwin in view of U.S. Patent No. 6,390,019 to Grimbergen. This rejection is respectfully traversed. Claims 21 and 22 depend from Claim 13 and thus are patentable over the cited references for at least the reasons that Claim 13 is patentable. Withdrawal of the rejection is requested.

It is submitted that the difference between the claimed subject matter and the prior art are such that the claimed subject matter, as a whole, would not

have been obvious at the time the invention was made to person having ordinary skill in the art.


In view of the foregoing, the application is respectfully submitted to be in condition for allowance, and prompt favorable action thereon is earnestly solicited.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned at (202) 624-2995 would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #101249.52602US).

Respectfully submitted,

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